

REMARKS

Claims 1-45 and 47-52 are pending in the application. Claims 1-34 stand rejected under 35 U.S.C. § 112, first paragraph. Claims 35-52 stand rejected under 35 U.S.C. § 103 as obvious over U.S. Patent No. 5,263,019 issued to Chu in view of Ngia further in view of U.S. Patent No. 4,709,391 issued to Kaizer.

1. Rejections Under Section 112, First Paragraph.

The Examiner states that the "adder module (as per the specification) does not receive a distorted version of the first signal, but an estimate of the echo of the first signal (including loudspeaker distortion) (specification page 9 lines 14-22)." As recited by Claim 1, the adder module uses the distorted signal modeled from the first audio signal to remove at least part of an echo from the second audio signal. Applicant respectfully directs the Examiner's attention to the specification starting at page 10, line 13 through page 12, line 20, which describes AGM 232 as modifying digital sample values "to model substantially nonlinear distortions that can occur during the process of generating the audio signal." The example depicted in Figure 3 has three distortion modules (11:14) that each independently model a form of distortion (11:20) so that AGM 232 "outputs digital sample values representing the distorted audio signal" (12:20). The specification thus fully supports the recited distortion module that models distortion to produce a distorted signal that is provided to an adder module. As set forth in the specification, the distorted signal models distortion that occurs when a loudspeaker plays an audio signal. The audio signal played by the loudspeaker is picked up by a microphone as an echo. The distorted signal from the distortion module removes distortion picked up by the microphone since the modeled distorted signal is subtracted from the signal picked up by the microphone, including distortion produced by the loudspeaker and picked up by the microphone. Applicant notes that the distorted signal recited by Claims 1 and 22 are produced from the first audio signal (i.e., the signal sent to the loudspeaker) to remove an echo from the second audio signal (i.e., the signal picked up by a microphone that includes audio output of the loudspeaker. Thus, the recited distorted signal is fully supported by Applicant's specification.

In the response to Applicant's previous arguments, the Examiner states "the distorted signal must be sent to modules 234 and 236 as well. These modules will further produce an echo estimate of the distorted signal output by module 232. It is the echo estimate of the distorted signal that is passed to adder 220, not the distorted signal." Applicant respectfully directs the Examiner's attention to page 12, line 20- page 13, line 22, which describes module 234 as modeling echo characteristics and module 236 as modeling distortions associated with the processing of picking up the signal with a microphone. Thus, the Examiner's position that modules 234 and 236 estimate the distorted signal output by module 232 has no basis. The Examiner concludes his remarks by stating "It is the echo estimate of the distorted signal that is passed to adder 220, not the distorted signal. If only the distorted signal is sent to the adder, then the device would not function properly." As recited by Claims 1 and 22, the distorted signal is an estimate of the echo that is modeled from the first audio signal to remove the echo from the second audio signal. This is fully supported by the specification. Echo cancellation as described by the specification functions whether the complete echo is removed or only a part of the echo is removed. Accordingly, Applicant respectfully requests that the Examiner remove the rejections to Claims 1-34 under Section 112, first paragraph.

2. Rejections Under Section 103.

Chu discloses an echo canceling device having an adjustable filter for receiving a loud speaker signal and generating an echo estimation signal based on the relative strength of the loudspeaker signal compared with the microphone signal.

Ngia discloses a Hammerstein echo canceller that models loudspeaker and acoustic channel non-linearity in different frequency and amplitude regions with a separate model for each region.

Kaizer discloses a non-linear network coupled to a microphone or loudspeaker transducer to reduce non-linear distortion by compensating for at least one second or higher-order distortion component in the output of the component.

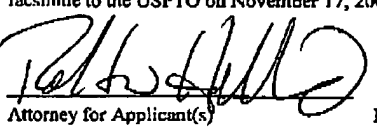
Claim 35 recites, in part, "an adder module for removing at least a portion of the echo of the sound pressure waves produced by the loudspeaker from the second signal responsive to the distorted signal."

Claim 52 recites, in part, "a distortion module interfaced with the first signal and operable to generate a distorted signal modeled to the distortion introduced by the microphone in the sensing of the loudspeaker sound pressure waves."


Applicant respectfully submits that Chu, Ngia and Kaizer cannot make obvious Claims 35 and 52 because these references fail to teach, disclose or suggest all elements recited by Claims 35 and 52 and, further, that no motivation exists to combine the references. The Examiner has failed to point out any motivation from within the references to combine Kaizer with Chu and Ngia. Absent a specific reference from one of the references to provide a motivation to combine the references, the Examiner's rejection is nothing more than hindsight reconstruction using Applicant's disclosure as a template. Accordingly, Applicant respectfully submits that Claims 35 and 52 are allowable, as are Claims 36-45 and 47-51 which depend from Claim 35.

CONCLUSION

In view of the remarks set forth herein, the application is believed to be in condition for allowance and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the examiner is requested to telephone the undersigned.

I hereby certify that this correspondence is being sent via facsimile to the USPTO on November 17, 2004.	
 Attorney for Applicant(s)	<u>17 November 2004</u> Date of Signature

Respectfully submitted,


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